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Osakabe et al.

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(54) **LIQUID CONSUMING APPARATUS INCLUDING LIQUID TANK WITH ROTATABLE COVER**

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G03G 15/08 (2006.01)
B41J 2/20 (2006.01)

(52) **U.S. Cl.**
CPC ***B41J 2/1752*** (2013.01); ***B41J 2/175*** (2013.01); ***B41J 2/17509*** (2013.01); ***B41J 2/17553*** (2013.01); ***B41J 2/20*** (2013.01); ***G03G 15/0865*** (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

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(57) **ABSTRACT**

There is provided a liquid consuming apparatus including: a tank having a liquid storing chamber, an erected wall through which the liquid inside the liquid storage chamber is visible from outside of the tank, and an inlet which is formed to penetrate through the erected wall and via which the liquid is poured into the liquid storage chamber; a liquid consuming section which consumes the liquid stored in the liquid storing chamber; and a cover. A transmitting section and a checking section are formed in an upper surface, of the cover, under a condition that the cover is in the exposure position, the transmitting section configured to transmit information optically to a user of the liquid consuming apparatus and the checking section configured to prevent the liquid moving on a particular surface of the cover from arriving at the transmitting section.

19 Claims, 11 Drawing Sheets

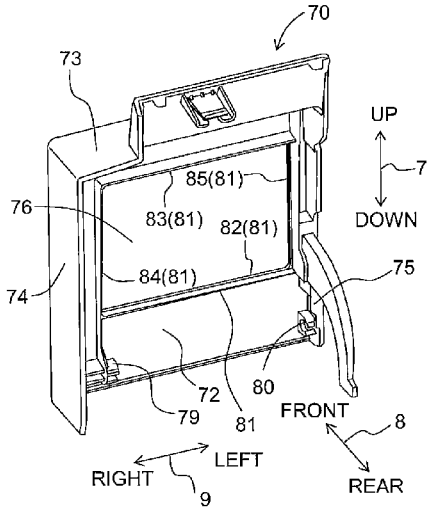


Fig. 1A

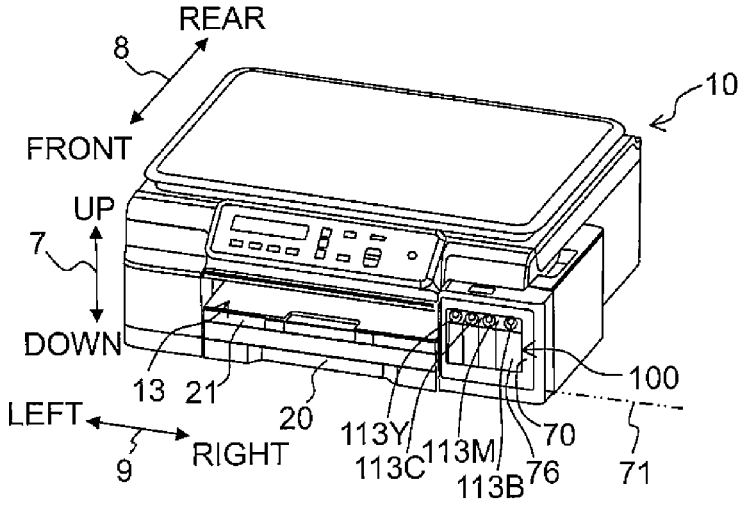


Fig. 1B

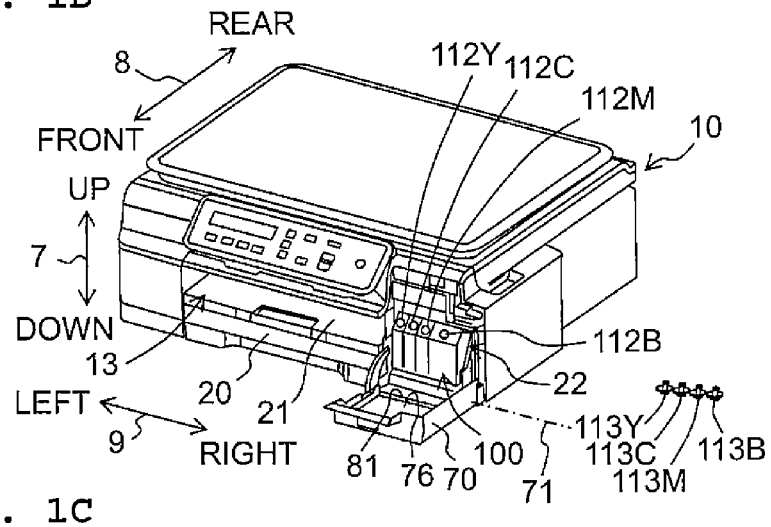


Fig. 1C

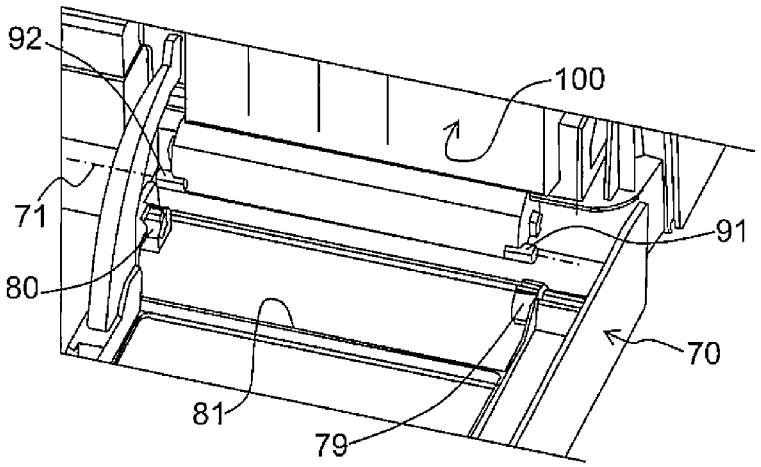


Fig. 2

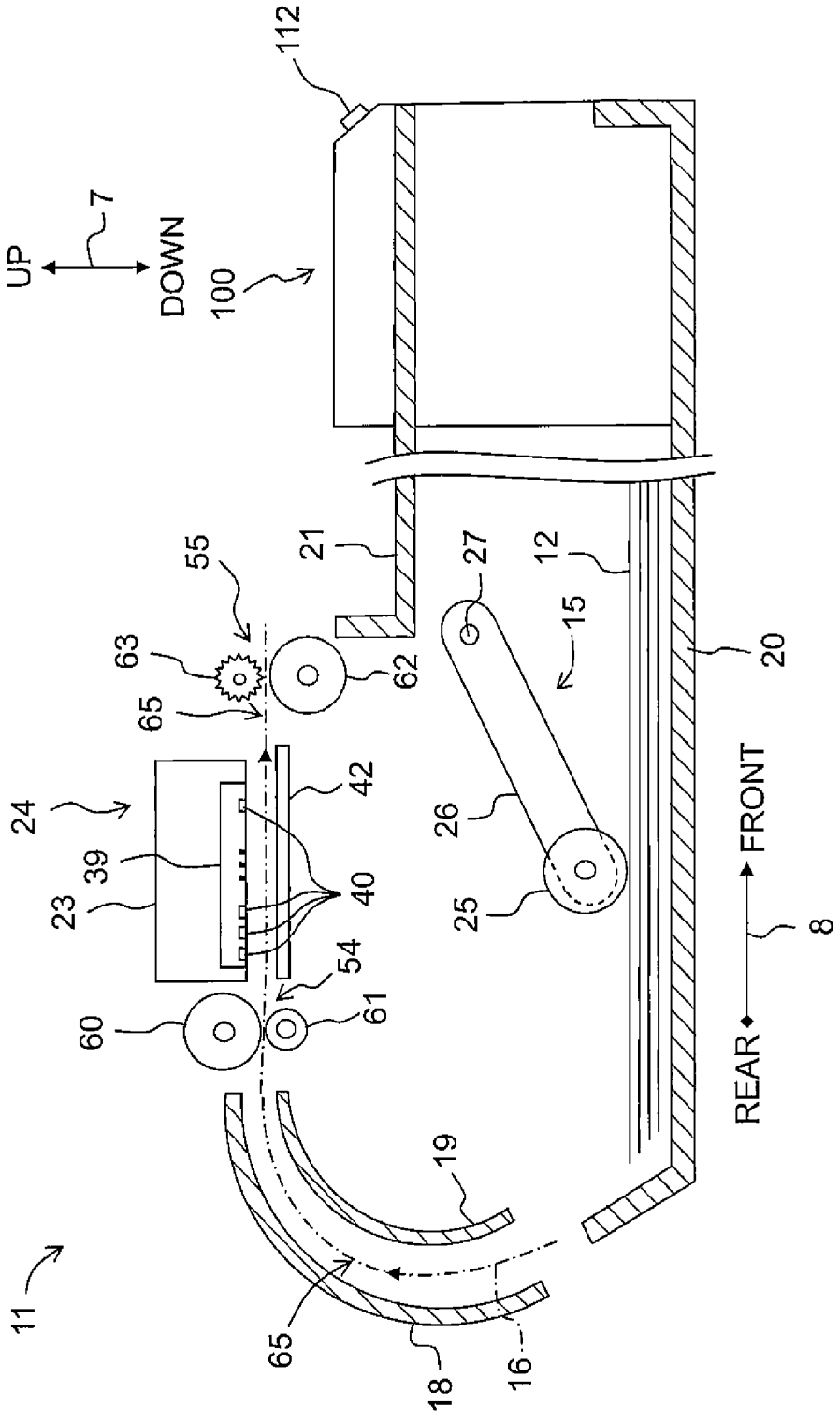
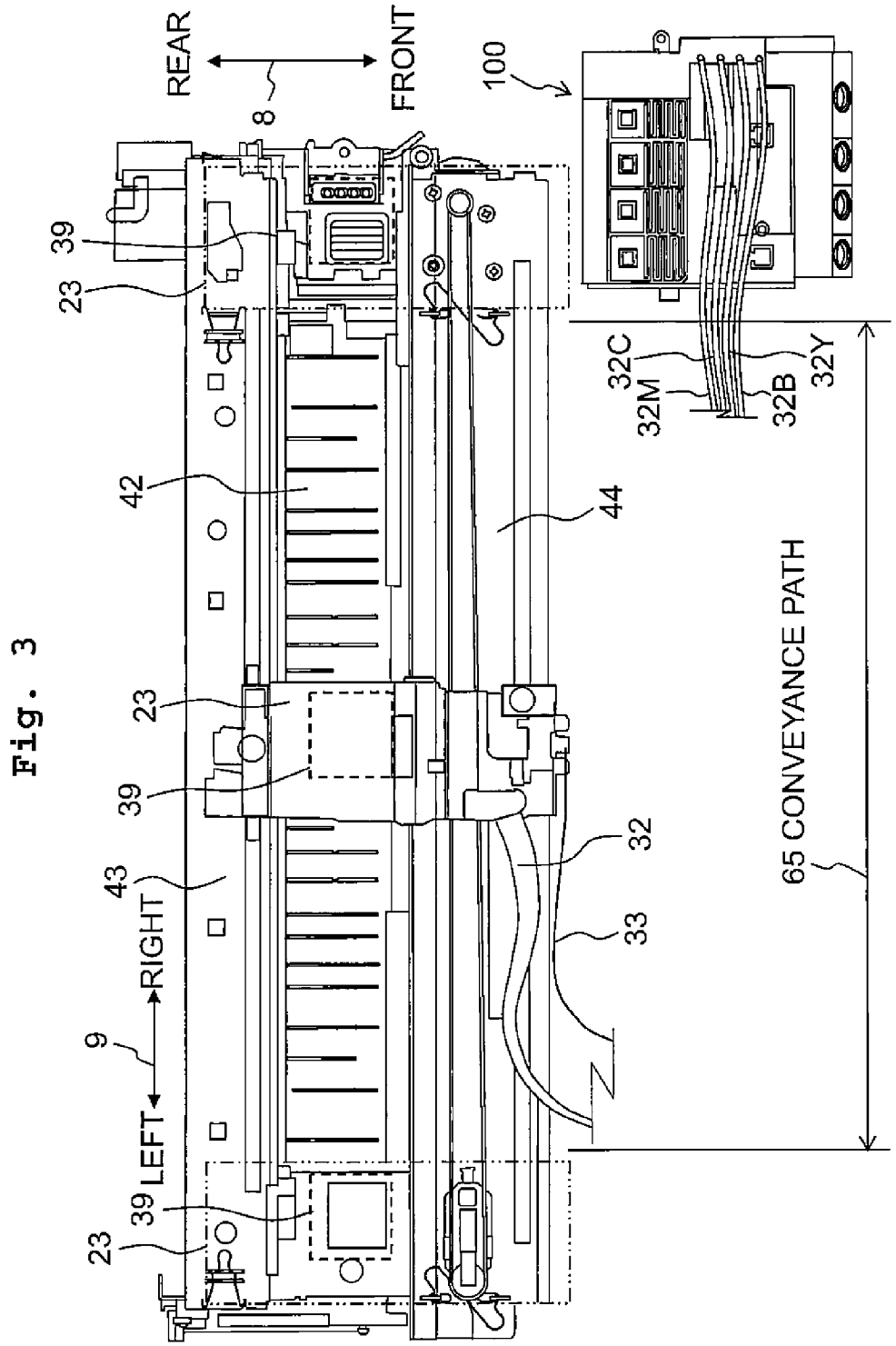

112
UP
7
DOWN
100
55
21
27
12
63
15
62
20
65
42
24
26
39
23
40
25
54
60
61
FRONT
8
REAR
19
11
65
18
16

Fig. 3


REAR
FRONT
8
100
39
23
42
44
23
39
43
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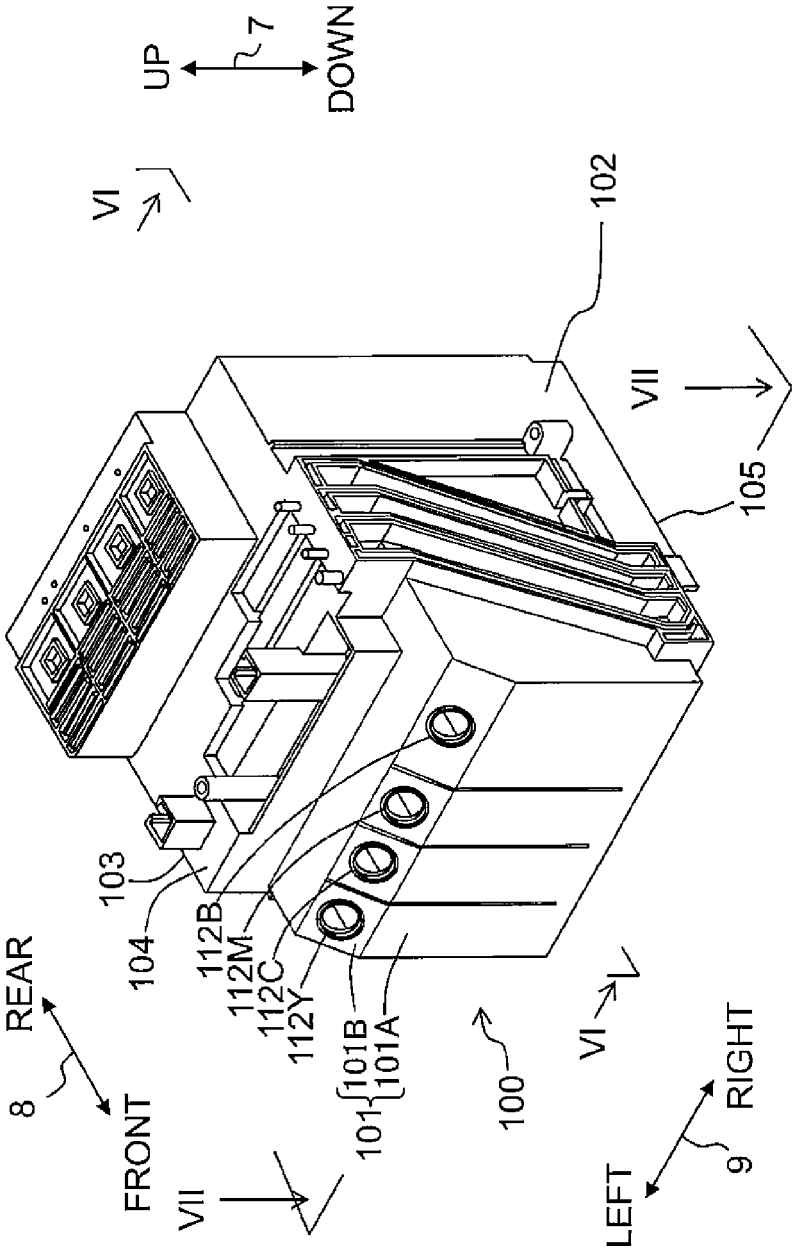
9
LEFT
39
23
32C
32M
32B
32Y
32
33
65 CONVEYANCE PATH

Fig. 4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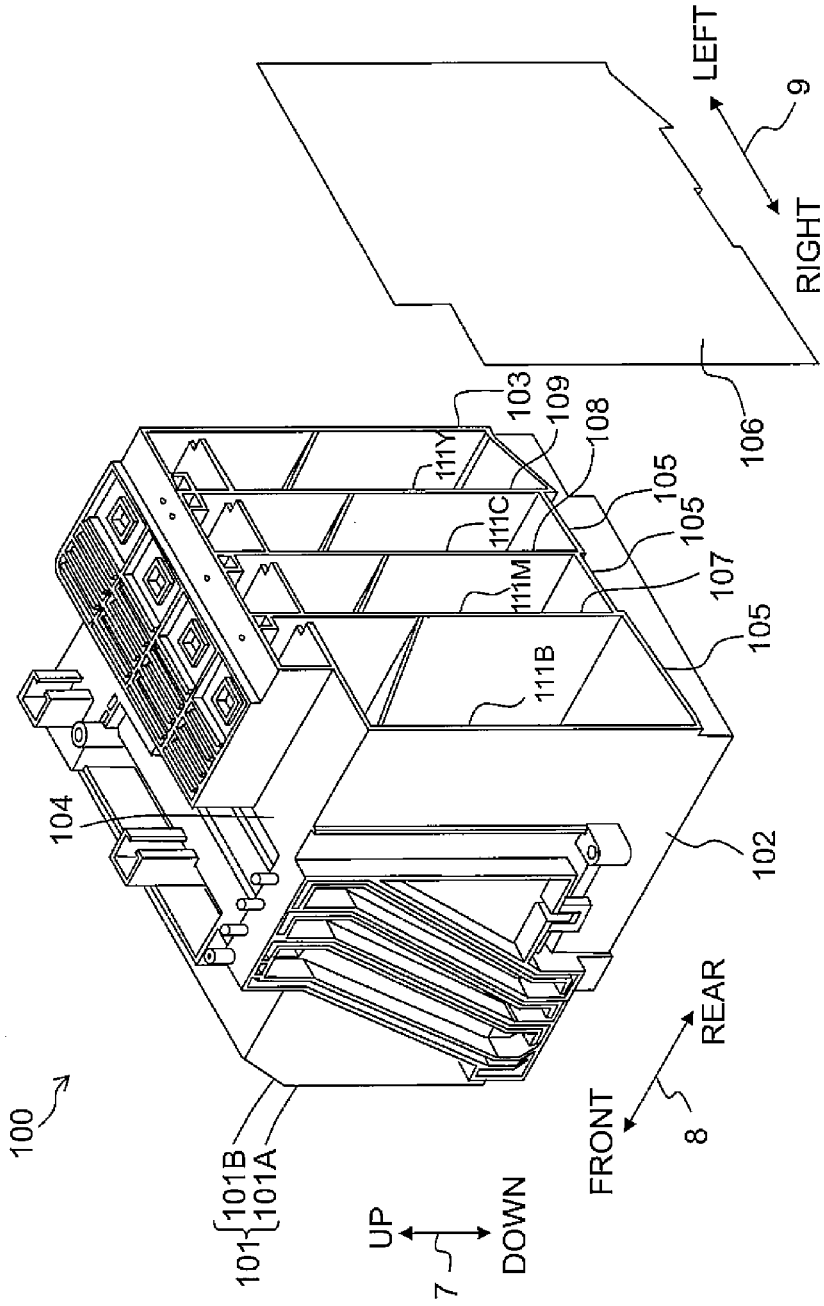
7
DOWN
VI
102
VII
105
103
104
112B
112M
112C
112Y
101
101B
101A
100
VI
REAR
8
FRONT
VII
LEFT
9
RIGHT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9
RIGHT
106
103
109
108
111Y
105
111C
105
111M
107
105
111B
104
102
100
101B
101A
101
UP
7
DOWN
FRONT
8
REAR

Fig. 5

Fig. 6B

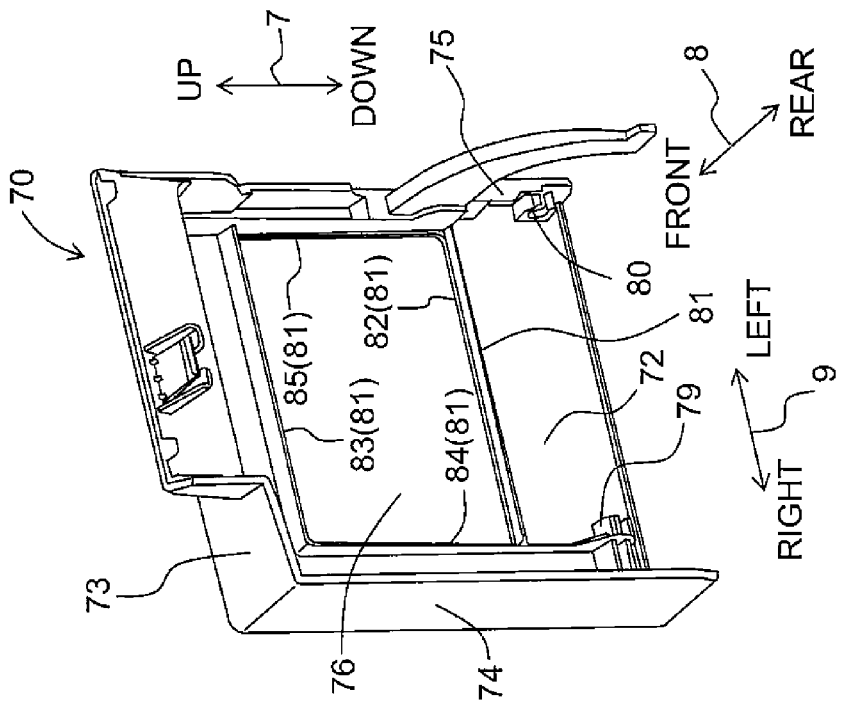

70
UP
7
DOWN
75
8
FRONT
REAR
80
81
82(81)
85(81)
83(81)
84(81)
72
79
LEFT
9
RIGHT
73
76
74

Fig. 6A

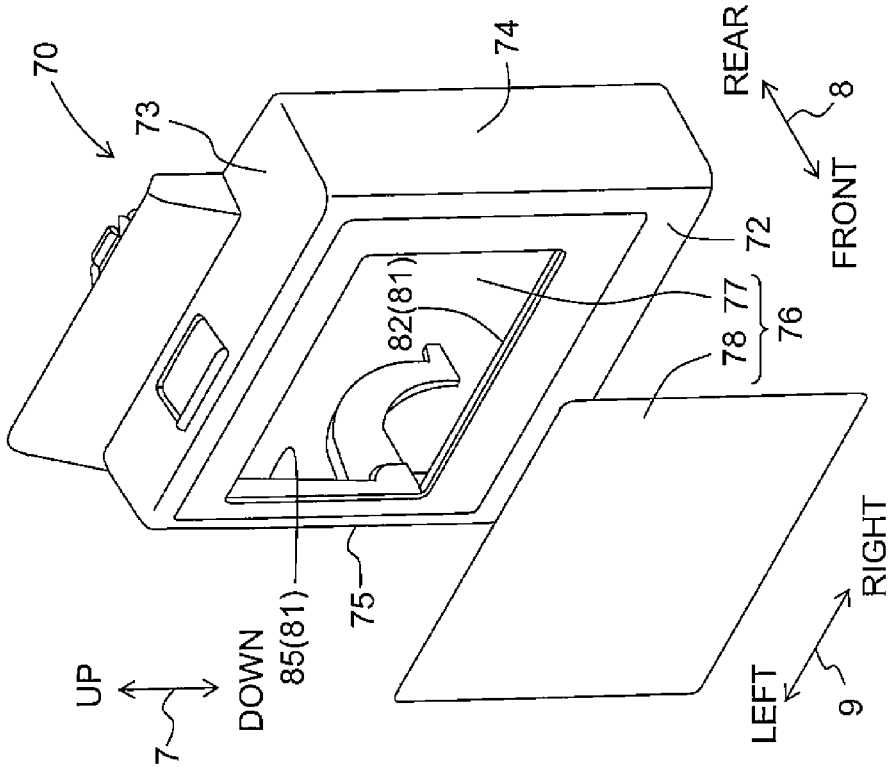
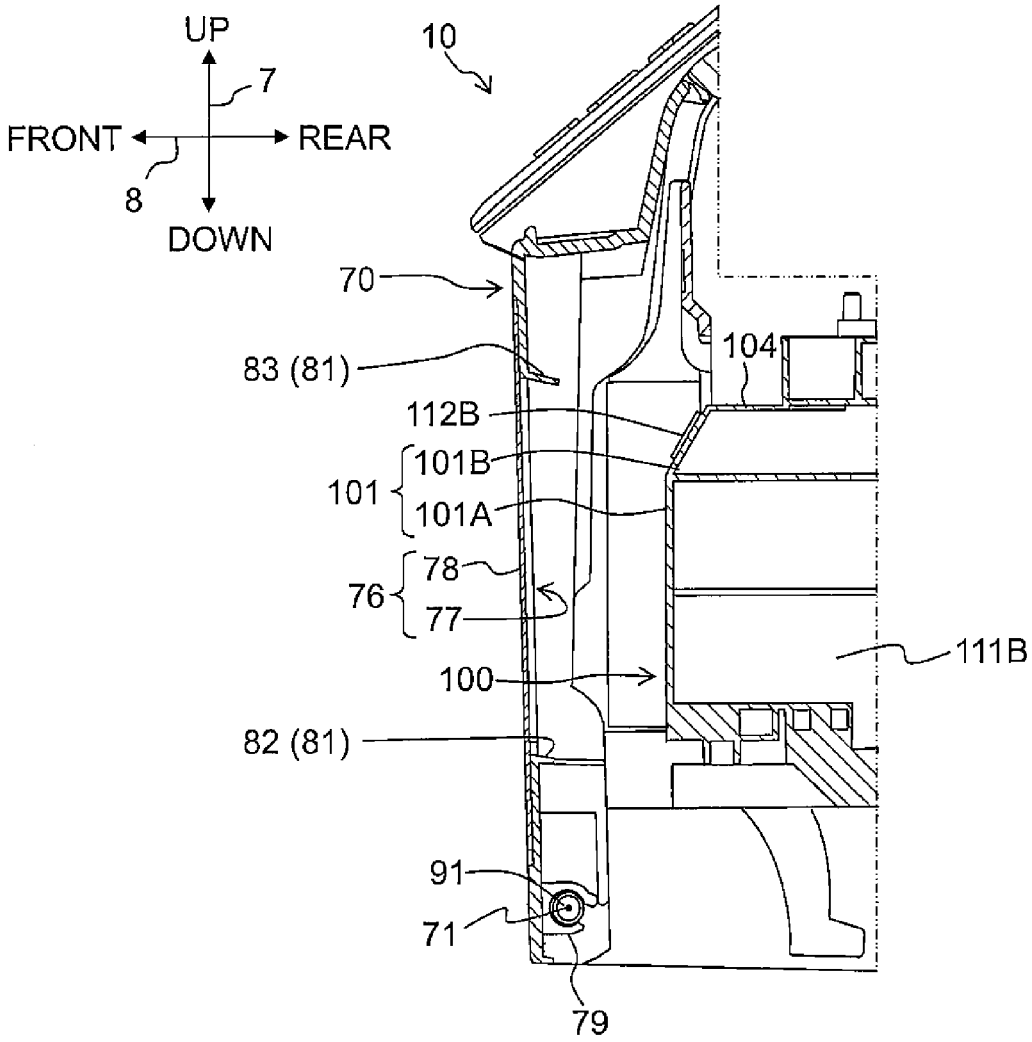

70
73
74
REAR
8
FRONT
72
82(81)
77
78
76
UP
7
DOWN
85(81)
75
LEFT
9
RIGHT

Fig. 7


UP
7
FRONT
REAR
8
DOWN
10
70
83 (81)
112B
101
101B
101A
76
78
77
100
82 (81)
91
71
79
104
111B

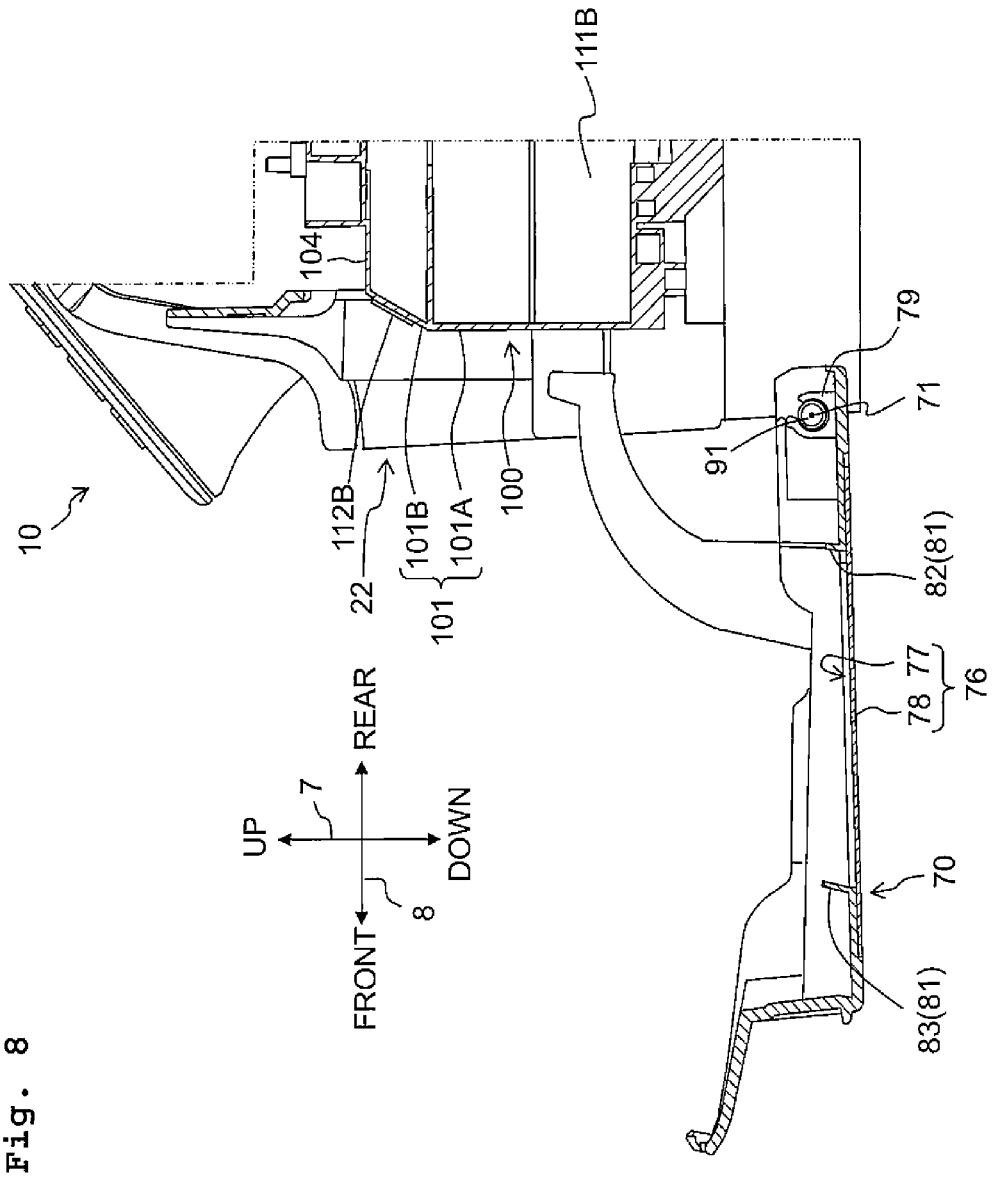
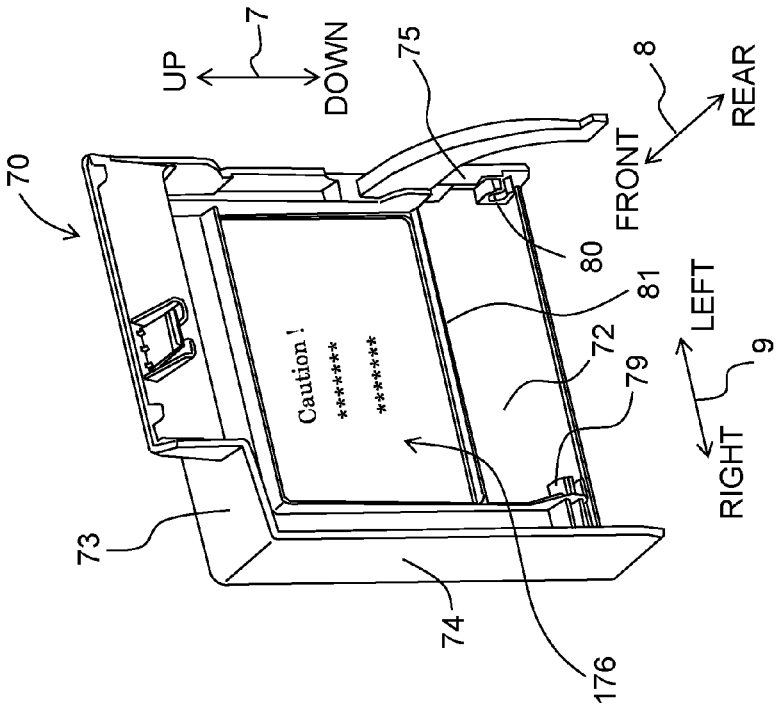

111B
104
79
71
91
10
112B
22
101B
101A
101
100
82(81)
78
77
76
REAR
UP
7
DOWN
FRONT
8
70
83(81)

Fig. 8

Fig. 9


UP
DOWN
7
75
8
REAR
FRONT
70
80
81
LEFT
9
72
79
RIGHT
Caution!
****
****
73
74
176

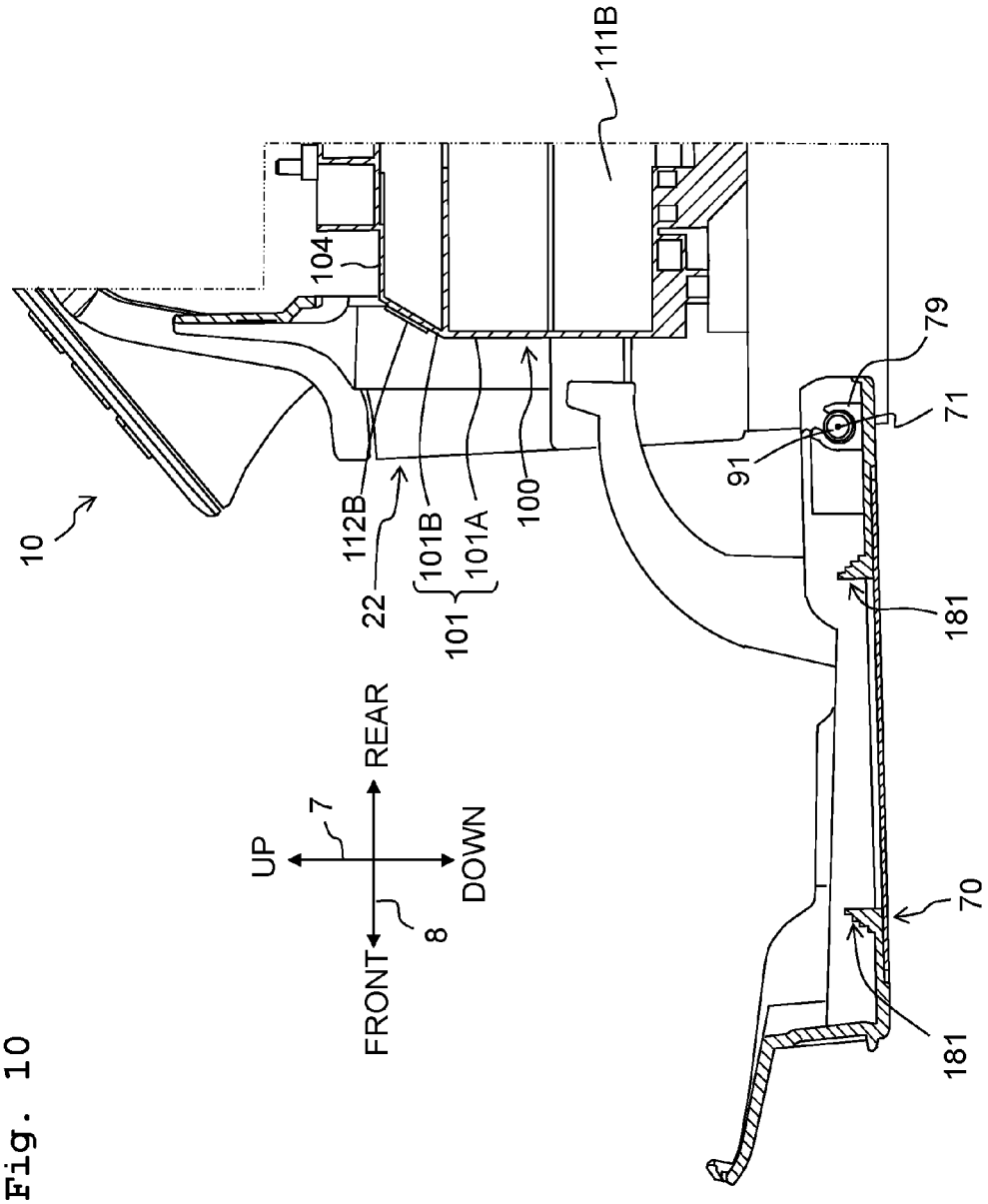

111B
104
79
71
91
10
112B
22
101B
101A
101
100
181
REAR
UP
7
DOWN
FRONT
8
70
181

Fig. 10

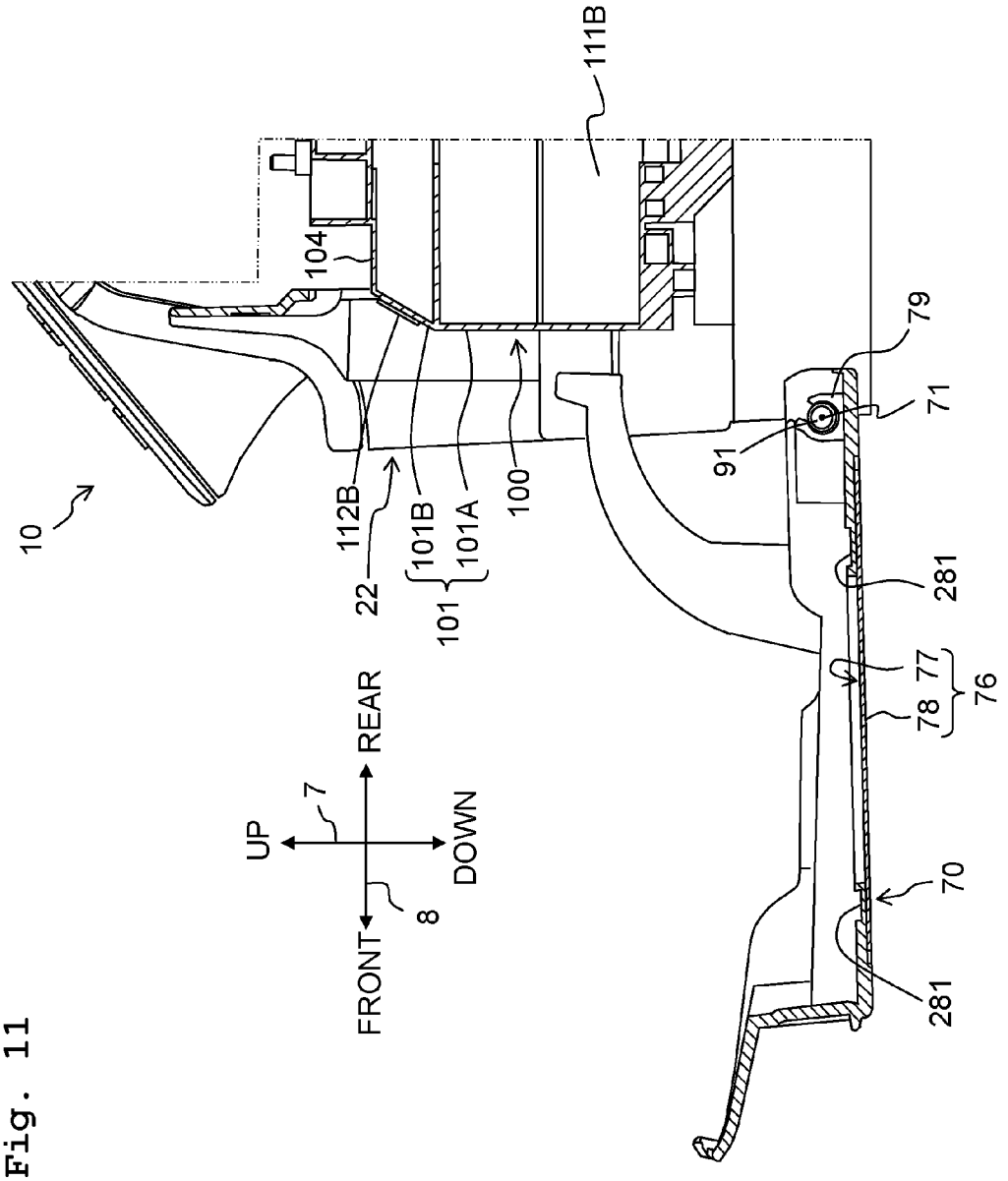

111B
104
79
71
91
10
112B
22
101B
101A
101
100
281
77
78
76
REAR
UP
7
DOWN
FRONT
8
70
281

Fig. 11

LIQUID CONSUMING APPARATUS INCLUDING LIQUID TANK WITH ROTATABLE COVER

CROSS REFERENCE TO RELATED APPLICATION

The present application claims priority from Japanese Patent Application No. 2014-200868 filed on Sep. 30, 2014 the disclosure of which is incorporated herein by reference in its entirety.

BACKGROUND

1. Field of the Invention

The present invention relates to a liquid consuming apparatus having a tank which is configured such that a liquid can be replenished or refilled to the tank via an inlet.

2. Description of the Related Art

Conventionally, there is known a liquid consuming apparatus provided with a tank configured such that a liquid can be replenished to the tank via an inlet, and a liquid consuming section configured to consume the liquid stored in the tank. For example, there is known a recording apparatus configured such that a cover having a visual confirmation window (viewing window) is opened to thereby allow an ink to be charged to an ink storing chamber via an inlet provided on the upper surface of an ink tank.

SUMMARY

In a case that the cover, of the recording apparatus having the above-described configuration, is rotatable about a rotational axis extending in the left-right direction at a position below the ink tank, there is such a possibility that the ink leaked from the inlet might adhere to the cover and thus might lower the visibility of the viewing window. As another example, such a case is also conceivable that the ink adheres to a sticker attached to the cover, which in turn lowers the visibility of any information indicated or written in the sticker.

The present teaching has been made in view of the above-described circumstances; an object of the present teaching is to provide a liquid consuming apparatus capable of suppressing the lowering in visibility of a transmitting section, which is provided on the cover and which is configured to optically transmit information to a user, due to the liquid leaked from the inlet of the tank.

According to an aspect of the present teaching, there is provided a liquid consuming apparatus configured to consume liquid, including:

a tank including a liquid storing chamber configured to store the liquid therein, and an erected wall which is provided upstandingly, which defines an end of the liquid storing chamber in a first direction crossing a vertical direction and through which the liquid inside the liquid storage chamber is visible from outside of the tank, the tank including an inlet which is formed to penetrate through the erected wall;

a liquid consuming section configured to consume the liquid stored in the liquid storing chamber; and

a cover configured to rotate between a cover position at which the cover covers the erected wall in the first direction and an exposure position at which the cover allows the erected wall to be exposed, the cover being configured to rotate around an axis extending in a second direction which intersects the vertical direction and the first direction;

wherein the axis of the cover is disposed below the inlet,

wherein the cover further comprises a particular surface facing the vertical direction in the exposure position, a transmitting section disposed on the particular surface, the transmitting section being configured to transmit information optically to a user of the liquid consuming apparatus, and a checking section disposed on the particular surface, the checking section being configured to prevent the liquid moving on the particular surface of the cover from arriving at the transmitting section.

According to the above-described configuration, the liquid leaked from the inlet and adhered to the cover can be checked or stopped at the checking section. As a result, it is possible to suppress any lowering in the visibility of the transmitting section which would otherwise be caused by any contamination of the transmitting section with the liquid.

According to another aspect of the present teaching, there is provided a liquid consuming apparatus configured to consume liquid, including:

a tank configured to store the liquid therein, and an erected wall which is provided upstandingly in a vertical direction, the elected wall facing a particular direction, the tank including an inlet which is formed to penetrate through the erected wall; and

a cover configured to rotate between a cover position at which the cover covers the erected wall in the particular direction and an exposure position at which the cover allows the erected wall to be exposed, the cover being configured to rotate around an axis extending in a further direction which intersects the vertical direction and the particular direction;

wherein the axis of the cover is disposed below the inlet,

wherein the cover further comprises a particular surface facing the vertical direction in the exposure position, the particular surface includes a first area disposed below the tank under the condition the cover is at the cover position, a second area disposed further than the first area in the particular direction under the condition the cover is at the exposure position, and a checking section disposed between the first area and the second area, the checking section being configured to prevent the liquid on the first area of the particular surface from arriving at the second area under the condition the cover is at the exposure position.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. **1**A, **1**B and **1**C are external perspective views of a multi-function peripheral **10**, wherein FIG. **1**A depicts a state that a cover **70** is closed, FIG. **1**B depicts a state that the cover **70** is opened, and FIG. **1**C is an exploded perspective view of a portion in the vicinity of the rotational axis of the cover **70**.

FIG. **2** is a vertical cross-sectional view schematically depicting the internal structure of a printer unit **11**.

FIG. **3** is a plan view depicting the arrangement of a carriage **23** and an ink tank **100**.

FIG. **4** is a front perspective view of the ink tank **100**.

FIG. **5** is a rear perspective view of the ink tank **100**.

FIGS. **6**A and **6**B are perspective views of the cover **70**, wherein FIG. **6**A is a perspective view of the cover **70** as seen from the side of the outer surface of a main wall **72**, and FIG. **6**B is a perspective view of the cover **70** as seen from the side of the inner surface of the main wall **72**.

FIG. **7** is a vertical cross-sectional view of the cover **70** at a cover position and of the ink tank **100**.

FIG. **8** is a vertical cross-sectional view of the cover **70** at an exposure position and of the ink tank **100**.

FIG. **9** is a perspective view of an alternative embodiment of the cover **70**.

FIG. **10** is a vertical cross-sectional view of an alternative embodiment the cover **70** at an exposure position and of the ink tank **100**.

FIG. **11** is a vertical cross-sectional view of another alternative embodiment the cover **70** at an exposure position and of the ink tank **100**.

DESCRIPTION OF THE EMBODIMENTS

An embodiment of the present teaching will be described below. Note that, however, the embodiment described below is merely an example of the present teaching; it goes without saying that it is possible to make any appropriate changes in the embodiment of the present teaching without departing from the gist and scope of the present teaching. Upward and downward are each a component of an up-down direction **7** and are opposite to each other; leftward and rightward are each a component of a left-right direction **9** and are opposite to each other; and frontward and rearward are each a component of a front-rear direction **8** and are opposite to each other. Furthermore, in the embodiment, the up-down direction **7** corresponds to the vertical direction, and each of the front-rear direction **8** and the left-right direction **9** corresponds to the horizontal direction.

Moreover, the up-down direction **7** is defined with a state that a multi-function peripheral **10** is usably installed or a posture in which the multi-function peripheral **10** is usably installed, as the reference. Note that the state that the multi-function periphery **10** is usably installed as depicted in FIGS. **1**A to **1**C will be referred to as a "usable state". Moreover, the posture in which the multi-function peripheral **10** is usably installed as depicted in FIGS. **1**A to **1**C will be referred to as a "usable posture". Further, the front-rear direction **8** is defined such that a side on which an opening **13** of the multi-function peripheral **10** is provided is designated as the front side (front surface), and the left-right direction **9** is defined as viewing the multi-function peripheral **10** from the front side (front surface). The front-rear direction **8** is an example of a first direction, and the left-right direction **9** is an example of a second direction.

<Overall Configuration of Multi-Function Peripheral **10**>

As depicted in FIGS. **1**A and **1**B, the multi-function peripheral **10** is formed to have a substantially rectangular parallelepiped shape. The multi-function peripheral **10** includes, at a lower portion of a casing thereof, a printer unit **11** which records an image onto a paper **12** (see FIG. **2**) by an ink-jet recording method. As depicted in FIG. **2**, the printer unit **11** includes a feeding section **15**, a feeding tray **20**, a discharge tray **21**, a conveyance roller section **54**, a recording section **24**, a discharge roller section **55**, a platen **42**, and an ink tank **100** (an example of a tank). Further, the multi-function peripheral **10** has various functions such as a facsimile function and a print function. The multi-function peripheral **10** is an example of a liquid discharging apparatus or a liquid consuming apparatus.

<Feeding Tray **20**, Discharge Tray **21**>

As depicted in FIGS. **1**A and **1**B, the feeding tray **20** is inserted into and removed from the multi-function peripheral **10** by a user, in the front-rear direction **8** through the opening **13**. The opening **13** is formed in a central portion in the left-right direction **9** of the front surface of the multi-function peripheral **10**. The feeding tray **20** is capable of supporting a plurality of sheets of the paper **12** that are stacked in the feeding tray **20**. The discharge tray **21** is arranged at the upper side of the feeding tray **20**, and is inserted or removed together with the feeding tray **20**. The discharge tray **21** supports the paper **12** discharged through a space between the recording section **24** and the platen **42** by the discharge roller section **55**.

<Feeding Section **15**>

The feeding section **15** feeds the paper **12** supported by the feeding tray **20** to a conveyance route **65**. As depicted in FIG. **2**, the feeding section **15** includes a feeding roller **25**, a feeding arm **26**, and a shaft **27**. The feeding roller **25** is rotatably supported by the feeding arm **26** at a front end thereof. The feeding roller **25** rotates in a direction for causing the paper **12** to be conveyed in a conveyance direction **16** when a conveyance motor (not depicted in the drawings) is reversely rotated. In the following description, the rotations of the feeding roller **25**, a conveyance roller **60**, and a discharge roller **62** in the direction for causing the paper **12** to be conveyed in the conveyance direction **16** are each referred to as "normal rotation". The feeding arm **26** is pivotably supported by the shaft **27** supported by the frame of the printer unit **11**. A bias is applied to the feeding arm **26** by an elastic force of a spring, etc. or by the self-weight of the feeding arm **26** such that the feeding arm **26** is pivoted and urged toward the feeding tray **20**.

<Conveyance Route **65**>

As depicted in FIG. **2**, in the interior of the printer unit **11**, a space is defined by an outer guide member **18** and an inner guide member **19** which are arranged to face with each other with a predetermined gap intervened therebetween. This space constructs a portion of the conveyance route **65**. The conveyance route **65** is a route or path that is extended from a rear-end portion of the feeding tray **20** toward the rear side of the printer unit **11**. Further, the conveyance route **65** makes a U-turn while being extended from the lower side to the upper side, at the rear side of the printer unit **11**; and then the conveyance route **65** reaches the discharge tray **21** via a space between the recording section **24** and the platen **42**. As depicted in FIGS. **2** and **3**, a portion of the conveyance route **65** between the conveyance roller section **54** and the discharge roller section **55** is provided at a substantially central portion in the left-right direction **9** of the multi-function peripheral **10**, and is extended in the front-rear direction **8**. Note that in FIG. **2**, the conveyance direction **16** of the paper **12** in the conveyance route **65** is indicated by an arrow of a dashed-dotted line.

<Conveyance Roller Section **54**>

As depicted in FIG. **2**, the conveyance roller section **54** is arranged at the upstream side of the recording section **24** in the conveyance direction **16**. The conveyance roller section **54** includes the conveyance roller **60** and a pinch roller **61** which are facing each other. The conveyance roller **60** is driven by a conveyance motor. The pinch roller **61** rotates following the rotation of the conveyance roller **60**. The paper **12** is conveyed in the conveyance direction **16** by being pinched between the conveyance roller **60** and the pinch roller **61** which are rotated positively by the normal rotation of the conveyance motor.

<Discharge Roller Section **55**>

As depicted in FIG. **2**, the discharge roller section **55** is arranged at the downstream side of the recording section **24** in the conveyance direction **16**. The discharge roller section **55** includes the discharge roller **62** and a spur **63** which are facing each other. The discharge roller **62** is driven by the conveyance motor. The spur **63** rotates following the rotation of the discharge roller **62**. The paper **12** is conveyed in the conveyance direction **16** by being pinched between the

discharge roller **62** and the spur **63** which are rotated positively by the normal rotation of the conveyance motor.

<Recording Section **24**>

As depicted in FIG. **2**, the recording section **24** is arranged between the conveyance roller section **54** and the discharge roller section **55** in the conveyance direction **16**. Further, the platen **42** and the recording section **24** are arranged to face each other in the up-down direction **7**, while sandwiching the conveyance route **65** therebetween. Namely, the recording section **24** is arranged at a position at which the recording section **24** is located above the conveyance route **65** in the up-down direction **7** and at which the recording section **24** faces the conveyance route **65**. The recording section **24** includes a carriage **23** and a recording head **39** (an example of a head or a liquid consuming section).

As depicted in FIG. **3**, the carriage **23** is supported by guide rails **43** and **44** which are extended in the left-right direction **9**, respectively at positions separated in the front-rear direction **8**. The guide rails **43** and **44** are supported by the frame of the printer unit **11**. The carriage **23** is connected to a known belt mechanism disposed on the guide rail **44**. The belt mechanism is driven by a carriage motor (not depicted in the drawings). Namely, the carriage **23** connected to the belt mechanism reciprocates in the left-right direction **9** by being driven by the carriage motor. As depicted by alternate long and short dash lines in FIG. **3**, the range of movement of the carriage **23** spans beyond the left and right end sides of the conveyance route **65** in the left-right direction **9**.

Further, an ink tube **32** which connects the ink tank **100** and the recording head **39** and a flexible flat cable **33** which electrically connects the recording head **39** and a control circuit board having a controller (not depicted in the drawings) mounted thereon are extended from the carriage **23**. The ink tube **32** supplies an ink stored in the ink tank **100** to the recording head **39**. More specifically, four ink tubes **32**B, **32**M, **32**C, and **32**Y via which inks of respective colors (which are black, magenta, cyan, and yellow colors) are distributed are extended from the ink tank **100**, and are connected to the carriage **23** in a bundled form. In the following description, these four ink tubes **32**B, **32**M, **32**C, and **32**Y will be collectively referred to as "ink tube(s) **32**" in some cases. The flexible flat cable **33** transmits a control signal output from the controller to the recording head **39**.

As depicted in FIG. **2**, the recording head **39** is installed on the carriage **23**. A plurality of nozzles **40** is formed in the lower surface of the recording head **39**. End portions (tip portions) of the nozzles **40** are exposed from the lower surface of the recording head **39** and from the lower surface of the carriage **23** on which the recording head **39** is installed. In the following description, the surface through which the end portions of the nozzles **40** are exposed will be referred to as a "nozzle surface" in some cases. The recording head **39** jets or discharges the ink as fine ink droplets (minute ink droplets) through the nozzles **40**. In a process of movement of the carriage **23**, the recording head **39** jets the ink droplets toward the paper **12** supported by the platen **42**. Accordingly, an image, etc. is recorded on the paper **12**.

<Platen **42**>

As depicted in FIGS. **2** and **3**, the platen **42** is arranged between the conveyance roller section **54** and the discharge roller section **55** in the conveyance direction **16**. The platen **42** is arranged so as to face the recording section **24** in the up-down direction **7**, and supports the paper **12**, conveyed by the conveyance roller section **54**, from therebelow.

<Ink Tank **100**>

As depicted in FIGS. **1**A to **1**C, the ink tank **100** is accommodated inside the multi-function peripheral **10**. The ink tank **100** is fixed to the multi-function peripheral **10** such that the ink tank **100** cannot be easily removed from the multi-function peripheral **10**. More specifically, the ink tank **100** is accommodated in the inside of the multi-function peripheral **10** via an opening **22** formed in the front surface of the casing of the multi-function peripheral **10**, at the right end of the front surface in the left-right direction **9**. The opening **22** is adjacent to the opening **13** in the left-right direction **9**. Note that, however, the front surface (a portion of a base wall **101**A and a portion of an inclined wall **101**B which will be described later on) of the ink tank **100** is located in front of the opening **22** in the front-rear direction **8** (more specifically, located in front of a portion of the front wall of the casing defining the opening **22**).

Further, the multi-function peripheral **10** is provided with a box-shaped cover **70** capable of covering the front surface, of the ink tank **100**, located in front of the opening **22**. The cover **70** is supported by the casing of the multi-function peripheral **10** to be rotatable between a cover position at which the cover **70** covers the opening **22** and a front wall **101** of the ink tank **100** (see FIG. **1**A), and an exposure position at which the cover **70** allows the opening **22** and the front wall **101** of the ink tank **100** to be exposed to the outside of the multi-function peripheral **10** at which the cover **70** does not cover the opening **22** and the front wall **101** of the ink tank **100** (see FIG. **1**B). The upper surface of the cover **70** in the cover position is substantially horizontal. Note that, alternatively, the upper surface of the cover **70** at the cover position may be inclined obliquely downward from the side of the rotational base end of the cover **70** toward the rotational distal end of the cover **70**.

As depicted in FIGS. **1**A, **1**B, **7** and **8**, the cover **70** in this embodiment is supported by the casing of the multi-function peripheral **10** to be rotatable about a rotational axis **71** extended in the left-right direction **9** at a lower end portion in the up-down direction **7**. The rotational axis **71** in this embodiment is located in front of the front wall **101** in the front-rear direction **8** (namely, is located on the side opposite to an ink chamber **111** (to be described later on) with respect to the front wall **101**), and below the ink tank **100** in the up-down direction **7**. Note that, however, it is sufficient that the position of the rotational axis **71** is at least below an inlet **112** (to be described later on), and further that the ink tank **100** and the rotational axis **71** have the above-described positional relationship under a condition that the ink tank **100** is in an inflow posture at which the liquid can be poured into the ink tank **100**.

As depicted in FIGS. **4** and **5**, the ink tank **100** has an outer shape that is substantially rectangular parallelepiped. The ink tank **100** has a front wall **101**, a right wall **102**, a left wall **103**, an upper wall **104**, and a lower wall **105**. On the other hand, the rear surface of the ink tank **100** is opened or uncovered. Further, by fixing a film **106** by welding to rear-end surfaces of the right wall **102**, the left wall **103**, the upper wall **104** and the lower wall **105**, the rear surface of the ink tank **100** is sealed. Namely, the film **106** forms the rear wall of the ink tank **100**. The ink tank **100** having the above-described configuration is molded or shaped as an integrated part or component by, for example, performing injection-molding with a resin material. For example, the inner shape or profile of the ink tank **100** (to be described later on) is defined by an unillustrated mold (metal mold) which is pulled out in the rearward direction from the uncovered rear surface of the ink tank **100**.

The upper wall **104** defines or demarcates the upper end of the ink chamber **111** in the up-down direction **7**. The lower wall **105** defines the lower end of the ink chamber **111** in the up-down direction **7**. The front wall **101**, the right wall **102** and the left wall **103** each as an example of the erected wall are provided upstandingly between the upper wall **104** and the lower wall **105** in a direction crossing the upper and lower walls **104** and **105**. Further, each of the walls **101** to **105** has at least light transmitting property or translucency to such an extent that the ink inside the ink chamber **111** is visually observable or recognizable from the outside of the ink tank **100**.

The front wall **101** is constructed of a base wall **101**A extending from the lower wall **105** substantially in the up-down direction **7** and an inclined wall **101**B which is connected or continued to the upper end of the base wall **101**A and which is inclined relative to the up-down direction **7** and the front-rear direction **8**. The inclined wall **101**B is formed with an inlet **112** penetrating through the inclined wall **101**B in the thickness direction thereof. The inclined wall **101**B is inclined rearward relative to the base wall **101**A (namely, inclined toward the ink chamber **111**).

<Ink Chamber **111**>

As depicted in FIG. **5**, a plurality of partition walls **107**, **108** and **109** which define or demarcate the internal space of the ink tank **100** is provided in the interior of the ink tank **100**. Each of the partition walls **107**, **108** and **109** is extended in the up-down direction **7** and the front-rear direction **8**, and is connected to the front wall **101**, the upper wall **104**, the lower wall **105** and the film **106**. Further, the partition walls **107**, **108** and **109** are disposed to be separated and away from one another in the left-right direction **9**. As a result, the internal space of the ink tank **100** is partitioned into four ink chambers **111**B, **111**M, **111**C and **111**Y that are adjacent in the left-right direction **9**. The ink chambers **111**B, **111**M, **111**C and **111**Y are each an example of a liquid storage chamber for storing ink to be jetted through the nozzles **40**.

The ink chamber **111**B is a space demarcated by the front wall **101**, the right wall **102**, the upper wall **104**, the lower wall **105**, the film **106** and the partition wall **107**. The ink chamber **111**M is a space demarcated by the front wall **101**, the upper wall **104**, the lower wall **105**, the film **106** and the partition walls **107** and **108**. The ink chamber **111**C is a space demarcated by the front wall **101**, the upper wall **104**, the lower wall **105**, the film **106** and the partition walls **108** and **109**. The ink chamber **111**Y is a space demarcated by the front wall **101**, the left wall **103**, the upper wall **104**, the lower wall **105**, the film **106** and the partition wall **109**.

In the following description, the ink chambers **111**B, **111**M, **111**C, and **111**Y are collectively referred to as "ink chamber(s) **111**" in some cases. Further, reference numerals having different alphabetic suffixes (B, M, C, and Y) are assigned to four components provided while corresponding to the ink chambers **111**B, **111**M, **111**C and **111**Y, respectively; in a case that these components are collectively referred to, then these components are assigned with a reference numeral(s) while omitting the respective alphabetic suffixes, in some cases.

Inks of different colors are stored in the ink chambers **111**, respectively. Specifically, black ink is stored in the ink chamber **111**B, cyan ink is stored in the ink chamber **111**C, magenta ink is stored in the ink chamber **111**M, and yellow ink is stored in the ink chamber **111**Y. Each of the color inks is an example of a liquid. However, the number of ink chambers **111** and the colors of the inks are not restricted to the number and the colors in the above-described example. The ink chambers **111** are arranged along the left-right direction **9**. Further, among the four ink chambers **111**B, **111**M, **111**C and **111**Y, the ink chamber **111**B is arranged at the rightmost side and the ink chamber **111**Y is arranged at the leftmost side. Namely, the ink chambers **111**B, **111**M1 **111**C and **111**Y are arranged such that the ink chamber **111**B storing the black ink is located to be most separated away from the ink chamber **111**Y storing the yellow ink. Furthermore, the ink chamber **111**B has a volume larger than the any other ink chambers **111**M, **111**C and **111**Y.

<Inlet **112**>

The inclined wall **101**B of the ink tank **100** is provided with inlets **112**B, **112**M, **112**C, and **112**Y (hereinafter, collectively referred to as "inlet(s) **112**") via which the inks are allowed to flow into the ink chambers **111**, respectively. The inlet **112** penetrates through the inclined wall **101**B in a direction of the thickness of the inclined wall **101**B, and makes the corresponding ink chamber **111** communicate with the outside of the ink tank **100**. The inner surface of the inclined wall **101**B faces the ink chamber **111**, and the outer surface of the inclined wall **101**B faces the outside of the ink tank **100**. The inclined wall **101**B is inclined such that the outer surface thereof is located at a position above the inner surface of the inclined wall **101**B. Consequently, the inlet **112** allows the ink chamber **111** and the outside of the ink tank **100** to directly communicate with each other. Namely, between the inlet **112** and the ink chamber **111**, there is no channel which is bent or curved and which has a cross-sectional area smaller than the cross-sectional area of the inlet **112**. Further, it is allowable that the inlet **112** is formed in the upper wall **104**, rather than in the inclined wall **101**B.

The inclined wall **101**B and the inlet **112** provided on the inclined wall **101**B are exposed to the outside of the multi-function peripheral **10** by locating the cover **70** at the exposure position under a condition that the cover **70** is located at the exposure position as depicted in FIG. **1**B. Further, the inlet **112** is provided on the inclined wall **101**B to be in front of the opening **22**. In the present embodiment, the posture of the ink tank **100** at which the ink can be flowed into the ink chamber **111** through the inlet **112** (inflow posture) coincides with the posture of the ink tank **100** when the multi-function peripheral **10** is in the usable state. Namely, when the multi-function peripheral **10** is in the usable state, the ink is poured into the ink chamber **111** through the inlet **112**. Although the inlet **112** in this embodiment is circular-shaped, the shape of the inlet **112** is not limited to this; the inlet **112** may be oval-shaped, polygonal-shaped, etc.

The ink tank **100** has caps **113**B, **113**M, **113**C and **113**Y (hereinafter collectively referred to as "cap(s) **113**" in some cases) that are detachably attached with respect to the inlets **112**. As depicted in FIG. **1**A, the cap **113** attached to the inlet **112** blocks or closes the inlet **112** by making a tight contact with the periphery of the inlet **112**. On the other hand, as depicted in FIG. **1**B, in a case that the cap **113** is removed from the inlet **112**, the inlet **112** is open or released. The cap **113** is attached to and removed from the inlet **112** in a state that the cover **70** is located at the exposure position. Further, by removing the cap **113** from the inlet **112**, the ink can be poured into the ink chamber **111** via the inlet **112**.

Note that an ink outflow channel (not depicted in the drawings) is provided in each of the ink chambers **111**B, **111**M, **113**C and **113**Y. The ink outflow channel is a channel that allows the ink stored in the corresponding ink chamber **111** to flow out of the ink tank **100**. An end of the ink outflow channel is connected to the ink chamber **111** corresponding thereto; the other end of the ink outflow channel is connected to the ink tube **32** corresponding thereto. With this, the ink

stored in each of the ink chambers **111** is supplied to the recording head **39** via one of the ink outflow channels and one of the ink tubes **32** which correspond to the ink chamber **111**.

Further, atmosphere communicating holes (not depicted in the drawings) are provided on the ink chambers **111**B, **111**M, **111**C and **111**Y, respectively. The atmosphere communicating hole allows the ink chamber corresponding thereto to communicate with the atmosphere. With this, the internal pressure in each of the ink chambers **111** is maintained at the atmospheric pressure. As a result, any excessive supply of the ink due to the increase in inner pressure in the ink chamber **111** or any backflow of the ink due to the decrease in inner pressure in the ink chamber **111**, etc. are suppressed. Further, the atmosphere communicating hole is provided with a semipermeable membrane, etc. configured to suppress any leaking of the ink.

<Cover **70**>

As depicted in FIG. **6**, the cover **70** is a box-shaped member having a main wall **72** having a substantially rectangular-shape and side walls **73**, **74** and **75** projecting from the outer periphery of the main wall **72** in the thickness direction of the main wall **72**. The side wall **73** is disposed on the cover **70** at the rotational distal end thereof, so as to extend along the outer periphery of the main wall **72**. The side wall **74** is disposed to extend along the outer periphery of the main wall **72** from an end portion, of the side wall **73**, at one side in the left-right direction **9**. The side wall **75** is disposed to extend along the outer periphery of the main wall **72** from an end portion, of the side wall **73**, at the other side in the left-right direction **9**. Namely, the side walls **74** and **75** are arranged to face each other in the left-right direction **9**. The outer surface of the cover **70** (in other words, the outer surfaces of the main wall **72** and of the side walls **73** to **75**) are continued to the outer surface of the multi-function peripheral **10**. Namely, the outer surface of the cover **70** constructs a portion of the outer surface of the multi-function peripheral **10**.

Further, the cover **70** is provided with a transparent window **76**. The transparent window **76** allows the front wall **101**, of the ink tank **100**, to be visually observable from the outside of the multi-function peripheral **10** in a state that the cover **70** is located at the cover position. The transparent window **76** is an example of the transmitting section configured to optically transmit information to a user of the multi-function peripheral **10**.

In this embodiment, the term "information to be optically transferred" means the position of the liquid surface (liquid level) of the ink which can be visually observed through the front wall **101**. Namely, the transmitting section in the embodiment is configured such that the transmitting section itself does not possess any information to be transmitted, but allows an object (the front wall **101** in the embodiment) having the information to be transmitted to be visually observable from the outside.

The transparent window **76** has an opening **77** having a substantially rectangular shape and penetrating through the main wall **72** in the thickness direction thereof, and a film **78** closing the opening **77**. The film **78** is formed of a light-transmitting or translucent material. The film **78** in this embodiment is adhered to the periphery of the opening **77**, on the side of the outer surface of the main wall **72** (namely, the surface of the cover **70** on the opposite side to the inner surface thereof which faces the front wall **101**).

Further, the side walls **74** and **75** are provided with bearings **79** and **80**, respectively. The bearings **79** and **80** are arranged on the rotational axis **71** in a state that the cover **70** is attached to the casing. Furthermore, as depicted in FIG. **1**C, a portion, of the casing, which demarcates the lower portion of the opening **22** is provided with a pair of spindles **91** and **92** projected in mutually separating directions on the rotational axis **71**. In the state that the cover **70** is attached to the casing, the bearings **79** and **80** receive the spindles **91** and **92**, respectively. With this, the cover **70** is made to be rotatable around the rotational axis **71** with respect to the casing.

Moreover, as depicted in FIG. **6**, a rib **81** is provided on the inner surface of the main wall **72** at a position surrounding the periphery of the opening **77**. The rib **81** is formed to project from the inner surface of the main wall **72** and to extend along the periphery of the opening **77**. The term "inner surface of the main wall **72**" means a surface on a side facing the ink tank **100** under a condition that the cover **70** is located at the cover position. In other words, the inner surface of the main wall **72** means the upper surface, of the main wall **72**, under a condition that the cover **70** is located at the exposure position. Further, the rib **81** is an example of the checking section configured to prevent the ink moving on the upper surface of the cover **70**, under the condition that the cover **70** is located at the exposure position, from arriving at the transparent window **76**.

The rib **81** is constructed of a first rib **82** arranged on the rotational base end side of the cover **70**, a second rib **83** arranged on the rotational distal end side of the cover **70**, a third rib **84** arranged on the side of the side wall **74**, and a fourth rib **85** arranged on the side of the side wall **75**. The end portions of the first and second ribs **82** and **83** are connected to the end portions of the third and fourth ribs **84** and **85**. The first and second ribs **82** and **83** are formed to extend in the left-right direction **9** (an example of the extending direction). The third and fourth ribs **84** and **85** are formed to extend in the up-down direction **7** (another direction of the extending direction) under the condition that the cover **70** is located at the cover position, and are formed to extend in the front-rear direction **8** (yet another direction of the extending direction) under the condition that the cover **70** is located at the exposure position.

The first to fourth ribs **82** to **85** project rearward from the inner surface of the main wall **72** under the condition that the cover **70** is located at the cover position (for example, see FIGS. **7** and **8**). Accordingly, a projection amount at which the first to fourth ribs **82** to **85** project is set to such a range that the first to fourth ribs **82** to **85** do not make contact with the front wall **101** of the ink tank **100** under the condition that the cover **70** is located at the cover position. Further, as depicted in FIG. **8**, the first to fourth ribs **82** to **85** project upward from the inner surface of the main wall **72** under the condition that the cover **70** is located at the exposure position. Note that the first rib **82** is formed to extend substantially vertically with respect to the main wall **72**. On the other hand, the second rib **83** is inclined with respect to the main wall **72**. In such a manner, the angle of the rib **81** with respect to the main wall **72** is not particularly limited. Further, the thickness of the first rib **82** is gradually thinned (namely, is tapered) from the projection base end side toward the projection distal end side. On the other hand, the thickness of the second rib **83** is substantially same or uniform in the projection direction. In such a manner, the thickness of the rib **81** in the projection direction is not particularly limited.

In the multi-function periphery **10** of the embodiment as described above, in a case that a user attempts to replenish or recharge the ink to the ink tank **100**, the user causes the cover **70** to rotate to the exposure position, removes the cap

113 from the inlet 112, and pours the ink from the released inlet 112. In this situation, the ink not poured into the inlet 112 or the ink overflowed from the inlet 112 moves on the front wall 101 and flows downward, and adheres to the inner surface (upper surface) of the cover 70 in the inflow posture. However, according to the above-described embodiment, the ink adhered to the inner surface of the cover 70 is checked or stopped by the rib 81 and is guided to the extending direction of the rib 81. As a result, it is possible to suppress the lowering in visibility of the front wall 101 due to the contamination of the transparent window 76 with the ink.

Note that in the embodiment, the explanation has been given, by way of example, about the rib 81 having the first to fourth ribs 82 to 85 surrounding the periphery of the transparent window 76. With this, it is possible to effectively suppress the adhesion of the ink to the transparent window 76. Further, the rib 81 functions also as a reinforcing section configured to reinforce the rigidity, of the cover 70, lowered due to the provision of the opening 77. As a result, it is possible to suppress any twisting of the cover 70 when the cover 70 is pivoted or rotated. The arrangement of the rib 81, however, is not limited to this. For example, it is sufficient that only the first rib 82 is disposed, such that the first rib 82 is located between the front wall 101 and the transparent window 76 in the front-rear direction 8 in the state that the cover 70 is at the exposure position. With this, it is possible to cut off any route via which the liquid mainly moves or flows on the cover 70. Further, it is allowable to omit the second rib 83 located at the farthest from the ink tank 100 under the condition that the cover 70 is located at the exposure position, and to construct the rib 81 with the first rib 82, the third rib 84 and the fourth rib 85.

Further, in the embodiment, the explanation has been made regarding the rib 81 as an example of the checking section. However, the specific example of the checking section is not limited to this. For example, it is allowable to provide a groove, a stepped portion, etc. in the inner surface of the main wall 72, instead of providing the rib 81. FIG. 11 illustrates an example groove 281, where the groove 281 is realized by recessing the inner surface of the main wall 72, or the groove 281 may be formed between a pair of ribs provided upstandingly and parallel to each other in the inner surface of the main wall 72. The stepped portion may be such a stepped portion 181 as shown in FIG. 10, in which a side thereof closer to the transparent window 76 is greater in height. Furthermore, the checking section may be configured by a combination of the rib, groove and stepped portion, etc.

Moreover, an ink absorbing member configured to absorb the ink may be arranged around the checking section. The ink absorbing member may be formed of a porous material such as foamed polyurethane. In a case that the checking section is the rib 81 or the stepped portion, the ink absorbing member may be arranged along the rib 81 or the stepped portion. Further, in a case that the checking section is the groove, the ink absorbing member may be filled inside the groove. With this, it is possible to further effectively check and stop the ink moving toward the transparent window 76.

Furthermore, it is allowable that the checking section may be configured to hold the ink by, for example, surface tension. With this, it is possible to effectively prevent the ink from arriving at the transparent window 76. Note that the specific shape of the checking section for holding the ink by the surface tension is appropriately selected depending on the kind of the ink (mainly the viscosity of the ink), the wettability of the surface of the cover 70, etc.

Moreover, the checking section may be configured to guide the ink in the left-right direction 9 by, for example, the capillarity. With this, it is possible to reduce the amount of the ink which might flow across the checking section, thereby making it possible to effectively prevent the ink from arriving at the transparent window 76. Note that the specific shape of the checking section for causing the capillarity is appropriately selected depending on the kind of the liquid (mainly the viscosity of the liquid), the wettability of the surface of the cover 70, etc. The checking section configured to cause the capillarity is preferably realized by a groove.

Further, although the ink tank 100 according to the embodiment has the four ink chambers 111B, 111M, 111C and 111Y which store the four color inks, respectively, the specific configuration of the ink tank 100 is not limited to this. For example, the ink tank may be configured to store only the black ink.

Furthermore, in the embodiment, the explanation has been given about the transparent window 76 as an example of the transmitting section. However, the specific example of the transmitting section is not limited to this. For example, as shown in FIG. 9, a transmitting section according to a modification may be a letter, figure or symbol, etc. 176, drawn in the inner surface of the main wall 72. In the following, the letter, figure, symbol, etc., will be collectively referred to as "letter, etc.". More specifically, the transmitting section may be configured to be visible by the user when the cover 70 is located at the exposure position and may have a procedure for replenishing the ink, a precaution when replenishing the ink, etc. described therein, etc.

Namely, the transmitting section according to the modification is different from the transmitting section of the embodiment in that the transmitting section itself has the information to be transmitted. Further, the transmitting section according to the modification optically transmits, to the user, the information that the transmitting section itself has, under the condition that the cover 70 is located at the exposure position. In other words, the user can see the letter, etc. drawn in the transmitting section by locating the cover 70 according to the modification at the exposure position.

By checking and stopping the ink moving toward the letter, etc. drawn in the main wall 72 by the above-described checking section, it is possible to suppress the lowering in visibility of the letter, etc. Note that the letter, etc., may be expressed by concave/convex portions formed in the inner surface of the main wall 72, or may be drawn in a sticker adhered to the inner surface of the main wall 72.

Further, in the above embodiment, although the explanation has been given about the ink as an example of the liquid, the present teaching is not restricted to this. Namely, instead of the ink, the liquid may be a pretreatment liquid which is to be discharged onto a recording paper before discharging an ink at the time of printing, or may be water, etc. which is to be sprayed in the vicinity of the nozzles 40 of the recording head 39 for preventing drying of the nozzles 40 of the recording head 39. Note that the present teaching is particularly effective by being applied to a liquid consuming apparatus provided with a tank storing a color liquid.

What is claimed is:

1. A liquid consuming apparatus configured to consume liquid, comprising:

a tank including a liquid storing chamber configured to store the liquid therein, and an erected wall which is provided upstandingly, which defines an end of the liquid storing chamber in a first direction crossing a vertical direction and through which the liquid inside

the liquid storage chamber is visible from outside of the tank, the tank including an inlet which is formed to penetrate through the erected wall;

a liquid consuming section configured to consume the liquid stored in the liquid storing chamber; and

a cover configured to rotate between a cover position at which the cover covers the erected wall in the first direction and an exposure position at which the cover allows the erected wall to be exposed, the cover being configured to rotate around an axis extending in a second direction which intersects the vertical direction and the first direction;

wherein the axis of the cover is disposed below the inlet;

wherein the cover further comprises a particular surface facing the vertical direction in the exposure position, a transmitting section disposed on the particular surface, the transmitting section being configured to transmit information optically to a user of the liquid consuming apparatus, and a checking section disposed on the particular surface, the checking section being configured to prevent the liquid moving on the particular surface of the cover from arriving at the transmitting section; and

wherein the checking section is arranged between the erected wall and the transmitting section in the first direction and extends in the second direction.

2. The liquid consuming apparatus according to claim **1**, wherein the checking section is one of a rib, groove and a stepped portion, which are provided on the particular surface of the cover.

3. The liquid consuming apparatus according to claim **2**, wherein the checking section is configured to hold the liquid by surface tension.

4. The liquid consuming apparatus according to claim **2**, wherein the checking section extends in an extending direction along an outer edge of the transmitting section, and is configured to lead the liquid in the extending direction by capillarity.

5. The liquid consuming apparatus according to claim **1**, wherein the checking section surrounds a periphery of the transmitting section.

6. The liquid consuming apparatus according to claim **1**, wherein the transmitting section is a transparent portion via which the erected wall is visually observable from outside of the liquid consuming apparatus under a condition that the cover is in the cover position.

7. The liquid consuming apparatus according to claim **1**, wherein a letter, figure or symbol is drawn in the transmitting section.

8. The liquid consuming apparatus according to claim **1**, wherein the checking section is a rib formed in the particular surface of the cover; and

the rib has a portion which is arranged between the erected wall of the tank and the transmission section in the first direction and which extends in the second direction.

9. The liquid consuming apparatus according to claim **8**, wherein the rib surrounds a periphery of the transmitting section.

10. The liquid consuming apparatus according to claim **9**, wherein the rib is located away from the erected wall of the tank at the cover position of the cover.

11. A liquid consuming apparatus configured to consume liquid, comprising:

a tank configured to store the liquid therein, and an erected wall which is provided upstandingly in a vertical direction, the erected wall facing a particular direction, the tank including an inlet which is formed to penetrate through the erected wall; and

a cover configured to rotate between a cover position at which the cover covers the erected wall in the particular direction and an exposure position at which the cover allows the erected wall to be exposed, the cover being configured to rotate around an axis extending in a further direction which intersects the vertical direction and the particular direction;

wherein the axis of the cover is disposed below the inlet,

wherein the cover further comprises a particular surface facing the vertical direction in the exposure position, the particular surface includes a first area disposed below the tank under the condition the cover is at the cover position, a second area disposed further than the first area in the particular direction under the condition the cover is at the exposure position, and a checking section disposed between the first area and the second area, the checking section being configured to prevent the liquid on the first area of the particular surface from arriving at the second area under the condition the cover is at the exposure position.

12. The liquid consuming apparatus according to claim **11**, wherein at least a part of the second area covers the erected wall, and the checking section is disposed below the tank at the cover position.

13. The liquid consuming apparatus according to claim **11**, further comprises a transparent portion disposed on the second area of the particular surface.

14. The liquid consuming apparatus according to claim **11**, wherein a letter, figure or symbol is drawn on the second area.

15. The liquid consuming apparatus according to claim **11**, wherein the checking section is one of a rib, groove and a stepped portion, which are provided on the particular surface of the cover.

16. The liquid consuming apparatus according to claim **15**, wherein the rib is positioned further than the tank in the particular direction under a condition that the cover is in the cover position.

17. The liquid consuming apparatus according to claim **11**, wherein the checking section is configured to hold the liquid by surface tension.

18. The liquid consuming apparatus according to claim **11**, wherein the checking section extends in an extending direction which intersects to the particular direction and the vertical direction, and is configured to lead the liquid in the extending direction by capillarity.

19. The liquid consuming apparatus according to claim **11**, wherein the checking section surrounds a periphery of the transmitting section.

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